

# Devices and Radiological Health at the Centennial: Panacea and Promise



by Suzanne White Junod, Ph.D.

In November 1895, Dr. Wilhelm Konrad Roentgen, head of the physics department at the University of Wurzburg, discovered x-rays as he was working with a cathode ray tube in his laboratory. He knew that the rays he was studying, later shown to be electrons, traveled only a short distance. On the evening of November 8th, Roentgen saw a flickering image on his bench that persisted only while his tube was charged, yet, was too far distant to be related to the rays he had been studying. He eventually surmised that he had discovered a new type of rays. Roentgen called them “x” rays because they were essentially unknown. The first permanent x-ray photograph was one made by Roentgen of the bones in his wife’s hand when he invited her into his laboratory for a demonstration. He published a paper on the subject before the year was out, and the press quickly picked up the story. The public soon became fascinated by this new means of viewing the inside of the human body. While it took almost 20 years before scientists explained the exact nature of x-rays, they began to be used diagnostically in medicine almost immediately.

Inspired by Roentgen’s discovery, three years later two recently-married scientists, Pierre and Marie Curie, funded their own research on pitchblende, a naturally-occurring compound with a high concentration of uranium ore, but one which was more radiologically active than uranium alone. They discovered a new radiological element in the blend in July 1898, and named it “polonium” for Marie’s native Poland. Further study revealed yet another radioactive substance in the same blend, which they announced at the Paris Academy of Sciences on December 26, 1898, and called “radium.”

Roentgen was awarded the first Nobel Prize for physics in 1901, and the Curies shared the third Nobel Prize for

physics in 1903, but the biological effects of radiation began to become apparent soon after both radiological discoveries. Dermatitis from Roentgen rays was reported in 1896, and a chronic case of dermatitis was documented in 1900. In 1901, the *Boston Medical and Surgical Journal* published a report on the death of a guinea pig fetus following x-ray exposure, and the first human death from radiation-induced cancer was recorded in 1902.

In the United States, William Herbert Rollins, D.S.S., M.D. at Boston City Hospital, was a pioneer and innovator in medical and dental applications of the x-ray. He invented and used a dental fluoroscope in his practice six months after learning of Roentgen’s rays, and became an early proponent for protection in the therapeutic use of the rays. Rollins published an article in 1904 recommending lead shielding for both the x-ray tube and the patient in medical and dental practice.

Such warning signs were noted principally by professionals using the rays for diagnosis and for cancer therapy. By 1913, “Curie-therapy” with radium was an established cancer subspecialty, treating thousands of patients in the United States and Europe annually. Based on the observation that mineral waters from hot springs had been sold for therapeutic consumption throughout recorded time, a popular market for self-administered radium soon arose, inspired by the U.S. homeopathic and naturopathic movement. Referred to as “mild radium therapy” to distinguish it from harsh cancer treatments with radium, it gave no initial indications of danger. In fact, quite the opposite was true. Swallowing radium initially makes the consumer feel stimulated and healthy. Over time, however, overstimulation and exhaustion follow as small amounts of the material lodge in the bones and the consumer experiences anemia. The relatively long

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lead time between consumption and the onset of symptoms made it difficult, however, to pinpoint the dangers.

By the time the radium dial painters' in the 1920s were diagnosed correctly with radium poisoning, there were many patent medicine preparations containing radium or purporting to contain radium on the market. Most were subpotent, containing only minute amounts of radon or merely exposed to radio waves, but one product, Radiothor, was found by Food and Drug Administration (FDA) investigators to be one of the few patent preparations that actually contained substantial levels of radioactivity. FDA and the Federal Trade Commission (FTC) began to investigate the trade and FDA issued public warnings, but it was the death of millionaire A.M. Byers in 1932 that put a stop to the traffic in radioactive medicines—almost overnight.

Byer's story captured headlines during the Great Depression once it was revealed that the millionaire had

ingested several half-ounce bottles (sold for a dollar each) daily for nearly two years before the onset of his gruesome symptoms. He had shared cases of the preparation with his friends as well. By the time Byer was called to testify at a government hearing on the dangers of the radioactive preparations, he was unable to attend in person and a special attorney was sent to take his testimony at his home. The physical description of Byer was horrific—he had lost his entire upper jaw and most of his lower jaw while holes were forming in his skull, and the rest of the bones in his body were disintegrating. Years after his death, Byer's body, which had to be buried in a lead casket, was found to be still dangerously radioactive. The Byer story became an exhibit in FDA's American Chamber of Horrors as regulators sought powers stronger than the FTC's cease-and-desist order to protect the public from such obvious radiological dangers.  $\Delta$

#### Humor

55 PUCK no. 1406 (Feb. 10, 1904).

"Now, this won't do, you know."

"What won't?"

"This line: 'Her eyes were like stars.'"

"Why not?"

"Why poets have been using that for ages. Be up-to-date! Say 'Like radium.'"

#### Health

56 PUCK no. 1431 (Aug. 3, 1904).

The children used to be so sickly! We had all the operations performed on them and all the serums inoculated. We employed the most expensive doctors, and had them in constant attendance dressed in our livery. But nothing seemed to do the little ones any good until we had their toys made of radium, and then the improvement was something wonderful. They haven't been sick a day since, and they eat just what they like and all they can hold of it, the dears!

And Mrs. Kreesers beamed.

#### A New Infant Industry

39 PUCK no. 943 (Mar. 18, 1896).

First Citizen: I wonder if there is any duty on photographs taken abroad by the Roentgen process?

Second Citizen: If there isn't, there ought to be. Think we want to have this country flooded with cheap German photographs of the human interior?

Unless otherwise indicated, the information in this article was derived from the following references.

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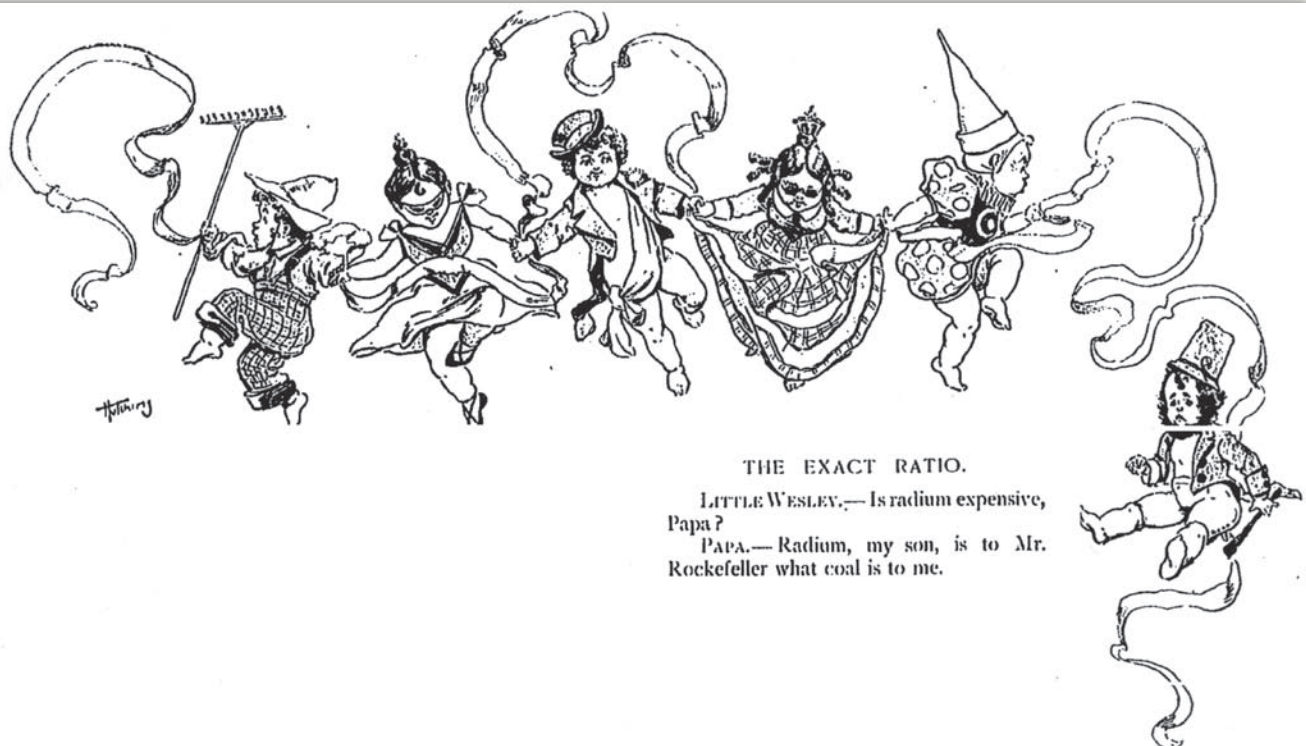
Roger M. Macklis, *The Great Radium Scandal*, 269(2) *SCI. AM.* 94-99 (1993).

*Recording the Radiographic Image*, 66:4 *RADIOLOGIC TECH.* 241-46 (1995).

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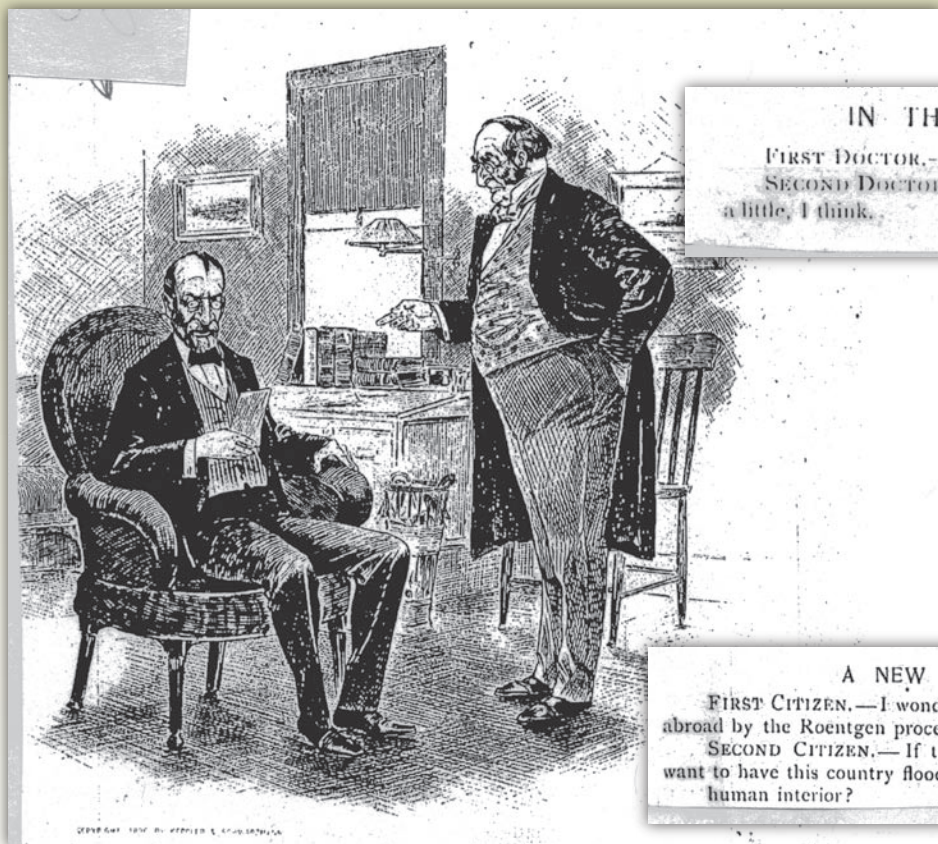


*Metallic Tractors*—Dr. Elisha Perkins' patent metallic tractors, consisting of two rods of brass and iron, were about three inches long and were the earliest recorded fraudulent medical device marketed in the United States. Perkins' tractors were sold to cure diseases by eliminating them from the body. Even George Washington is reported to have purchased a set for his family. By the turn of the 19th century, however, they had been exposed as a fraud. *Print courtesy of FDA History Office.*



*The Exact Ratio* (55 Puck no. 1408 (Feb. 24, 1904)).





### IN THE NEAR FUTURE.

FIRST DOCTOR.— Good photograph, is n't it?

SECOND DOCTOR.— Fairly good. Flatters the left lung a little, I think.

### A NEW INFANT INDUSTRY.

FIRST CITIZEN.— I wonder if there is any duty on photographs taken abroad by the Roentgen process?

SECOND CITIZEN.— If there is n't, there ought to be. Think we want to have this country flooded with cheap German photographs of the human interior?

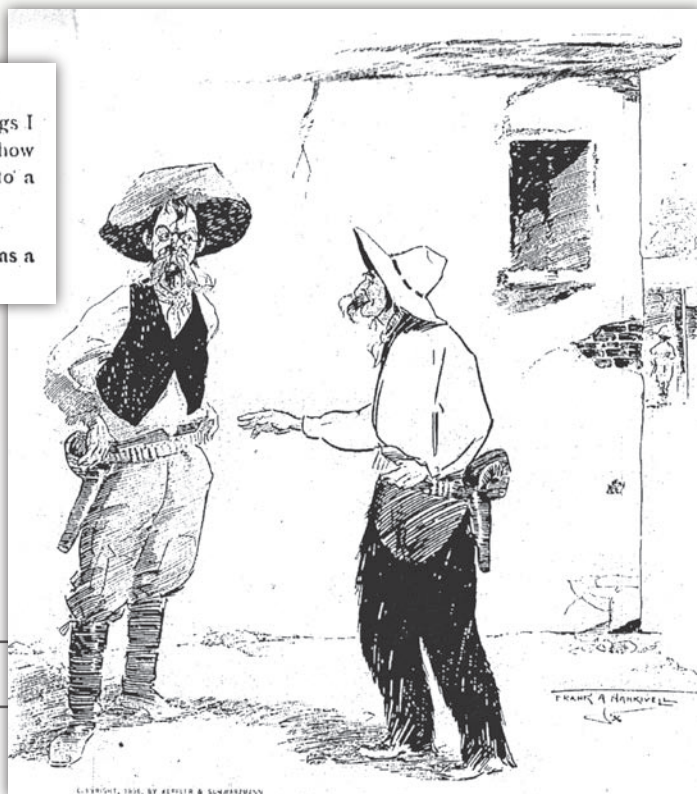
*In the Near Future* (39 Puck no. 943 (Mar. 18, 1896)).—Roentgen's rays were put to use immediately creating images of the interior of the human body. Comparisons with regular photographs were common as seen in this humorous dialogue between doctors.

### A TRIUMPH OF SCIENCE.

FIRST WESTERNER.— Them "X"-rays are the greatest things I ever heerd of! You know how Tornado Pete was always tellin' how he was carryin' three bullets inside of him? Well, Pete got into a serape lately an' a doctor turned them rays on him —

SECOND WESTERNER.— An' found the bullets?

FIRST WESTERNER.— Found nothin'! Found that Pete was a liar, jist as I always thought he was.



*A Triumph of Science* (40 Puck no. 1020 (Sept. 23, 1896)).





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## THE ENDLESS SEARCH.

PONCE DE LEON. — They laugh at me, but they still keep it up!

*The Endless Search* (48 Puck no. 1247 (Jan. 30, 1901))—Marie Curie's discovery of radium was popularly portrayed as an element, which generated light and heat, yet did not consume itself. Glycerophosphate of sodium had been recommended by Wilhelm Heinrich Erb (1840-1921), the prominent 19th century neurologist (nicknamed the German Charcot) for use in treating the rigidity of Parkinson's Disease. In this Puck frontispiece, both radium and glycerophosphate of sodium are portrayed as a single winged tonic escaping from the grasp of an aging man with the ghost of Ponce de Leon looking on and laughing at the continuing folly of men seeking a "fountain of youth."





### SWELL-HEADED.

THE ANT.—What 's the matter with the Firefly? He 's getting awfully conceited.

THE GRASSHOPPER.—Oh! He 's been reading about radium, and now he imagines he 's a multi-millionaire.

*Swell Headed* (55 Puck no. 1417 (Apr. 27, 1904)).

*The Latest Panacea* (64 JUDGE no. 1652 (June 14, 1913)).—Dr. Saubermann, a German scientist, delivered a lecture in Berlin the other day, showing that radium can restore the hardened arteries of old people and make them young again. We would like to see some of this radium. Every few weeks it pops up in the papers with some new ability. It can cure rheumatism, hang pictures, make the bed and go shopping Saturday afternoons. It doesn't make any difference what is wrong with you, according to the dispatches; if you will get a little radium and shake well before taking, it will cure you or tune the piano. If this new theory works out all right (as most of them don't), as soon as we get crow's feet or a crick where the doctor puts his thumb, we can go down to the drugstore, order some radium and an atomizer and the next day we will have to poke our friends with our umbrella to make them recognize us.

We are willing to let our arteries continue to harden and old age continue to creep on, if radium will do some other things we meet up with every day. If radium will keep the laundryman from pinning our shirts up and hiding the heads, and somebody at our hotel from eating up all the French bread, and give us better telephone connection when we call up Somebody on Seventeenth Street, it will bring a better shade of bloom back into our cheeks than if we had made the application direct on the arteries. If it will keep the soap out of our eyes, our collars from spreading apart at the top, and the band from stopping playing two blocks before it gets to us, we will risk the artery business. It is the little things in life that harden the arteries.

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**U. S. and City Probe Death of E. M. Byers By 'Radium Water'**

Richmond Man Victim of Poisoned Land Product, He Declares


**SEEK BAN ON SALE**

See News, Graphic and by Memphis and Tennessee



## MEDICINES CONTAINING RADIUM ARE EXCEEDINGLY DANGEROUS.

SINCE THE PRESENT FOOD AND DRUGS ACT DOES NOT PREVENT THE SALE OF MEDICINES THAT ARE DANGEROUS WHEN USED ACCORDING TO DIRECTIONS, THE FOOD AND DRUG ADMINISTRATION HAS ISSUED REPEATED WARNINGS AGAINST THEIR USE.




**COPELAND WARS ON FALSE CURES THAT DECEIT LAW**

New York Justice Warns He Intends Prosecute

**APPEALS FOR HELPERS**

Write: Cope Land, 100 Nassau St., New York City



**"IF THIS NEW THEORY WORKS OUT ALL RIGHT."**

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